



IntelBuild

BIM + 3D Consultants

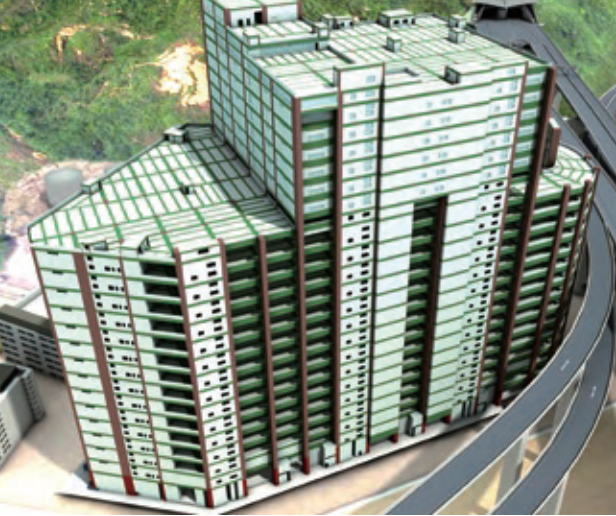
One BIM to Rule Them All

Project: Goodman Interlink Logistics Centre

Location: Tsing Yi

Type: Industrial Construction

Scheduled for completion: March 2011



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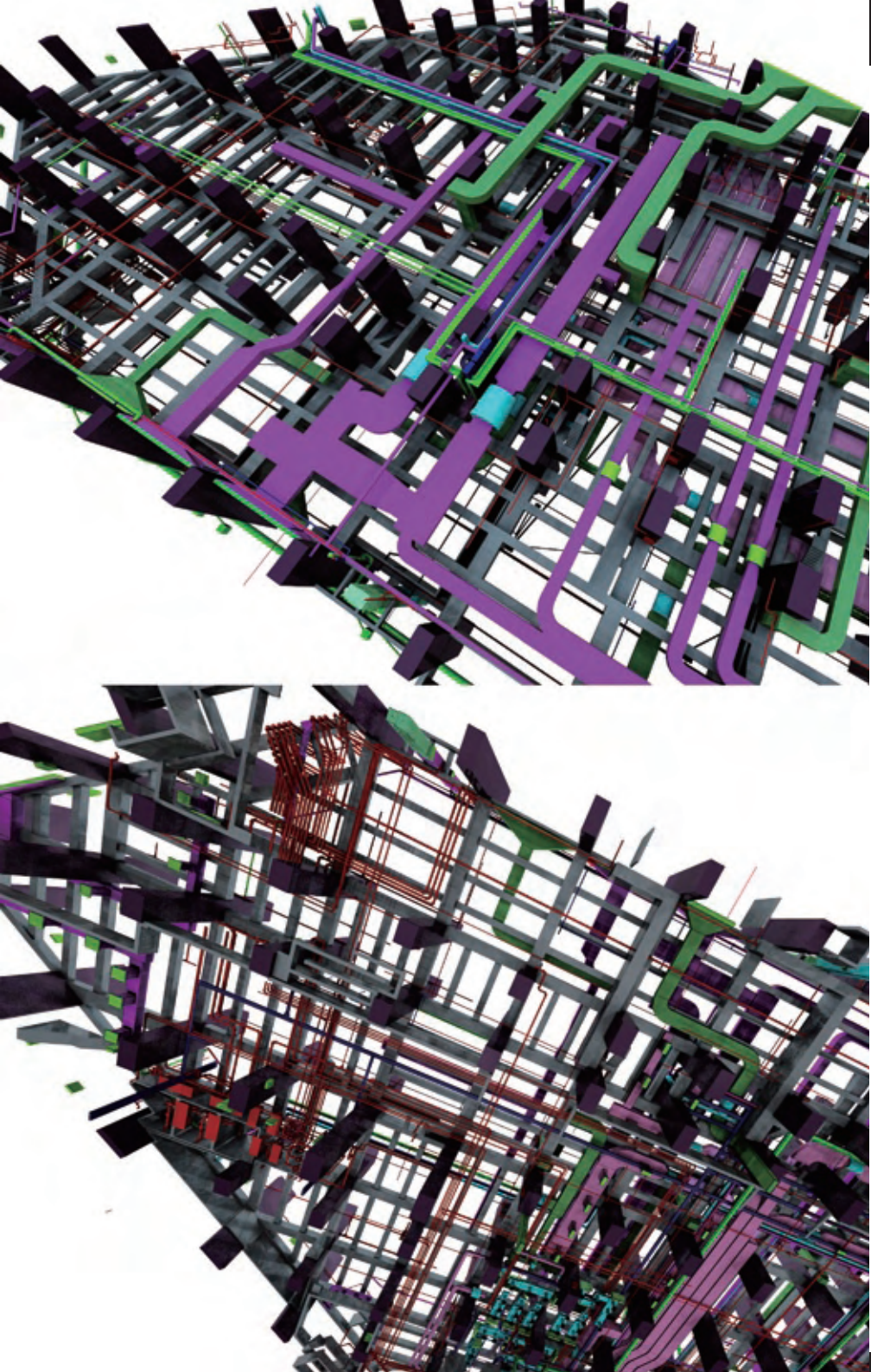
Ir. Ronan Collins,
founder and managing director, IntelliBuild

The plot of land where Goodman Hong Kong will build a logistics centre on Tsing Yi is little more than empty space at present. But on a screen in the office of IntelliBuild, a 4D Virtual Construction simulation shows the area transformed, as tower cranes help assemble the insitu-concrete floors, complete with spiral ramp.

The building is relatively simple, with logistics facilities on the first 16 levels, warehousing at upper levels, and offices at the top. BIM is chiefly being employed to ensure that construction proceeds smoothly, and the BIM model was used to develop the 4D simulation showing the construction process.

Independently checking building design

IntelliBuild specialises in design validation using BIM, and Goodman approached the firm regarding using a BIM model to analyse the design of the logistics centre project, like an independent checking engineer. “There will be fewer clashes through using BIM,” says IntelliBuild founder and managing director Ir. Ronan Collins. “Goodman’s revenue will be tied in to the delivery time of the building, and there will be





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Autodesk Revit software is being used for the BIM model – or rather models, as the information for the entire building would be overwhelming. The InteliBuild team transferred data from Autodesk Revit to Autodesk Navisworks for creating complete digital building models, performing clash analyses and working on coordination, and used Autodesk Maya for the construction simulation, complete with texture, lighting and shading.

The Goodman team had expected there would be benefits including reductions of clashes during construction, but were surprised by some of the benefits of the 3D models and simulations produced from the BIM model.

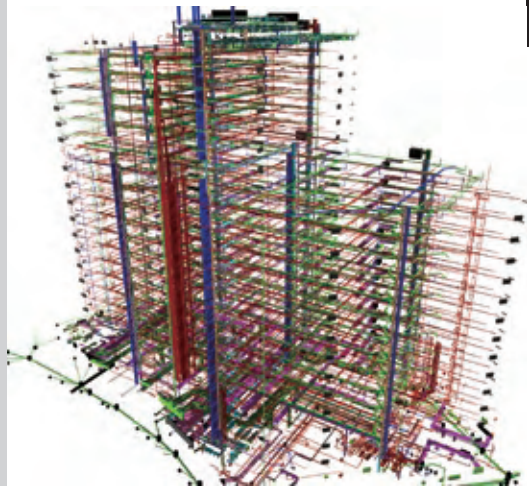
An overall BIM strategy

The InteliBuild BIM Project Manager devised an overall BIM strategy for the project at the outset. “You need a full BIM methodology – someone has to drive all the geometry, so the model fits into the overall project,” says Ir. Collins. “We wrote BIM specifications, with origin points, levels of detail, file names, names for materials, and geometry for clash analyses.”

The building had been designed using 2D drawings, and that 2D information was used for building the 3D model in Autodesk Revit. Rather than creating the entire building in Autodesk Revit as a single file, they created three architectural and structural models, which met at “natural” break points along movement joints, such as between the ramp and the main building.

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Then, they assembled 15 MEP models, with building services such as mechanical ventilation, air conditioning, fire services, drainage, and major electrical components. Four teams worked on these services – one building the model for ducts, another focusing on sprinklers, another on drainage, and one on electrical distribution. The InteliBuild BIM Project Manager coordinated all of the work. “We build the models in a very similar way to how the contractors will construct the real building,” says Ir. Collins.

Rather than work to a level of detail that would be impractical, the team used a 50mm threshold for the systems that they would model. There was no point in adding, say, electrical sockets – contractors would not position these according to detailed plans and the smaller components typically do not cause issues on site.

Once the initial modelling work was completed, the team could then assess the building design co-ordination – would the designs work in practice?

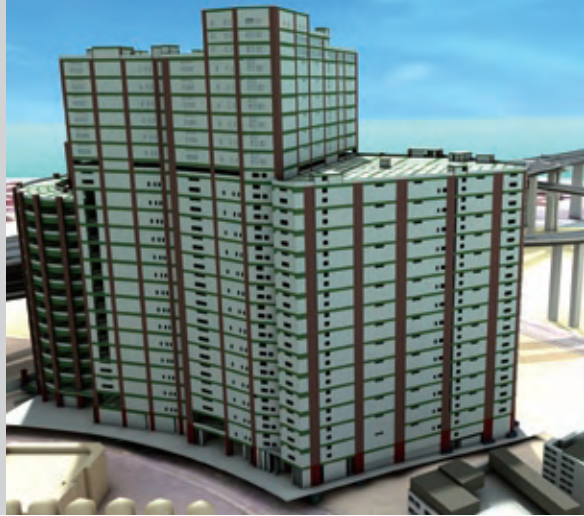
Finding and resolving design problems

In their first report to Goodman, InteliBuild noted 38 technical design issues, chiefly involving cases where they had detected that engineers’ drawings didn’t match the details on the architects’ drawings. They used Autodesk Navisworks to identify and present the technical queries, helping make discrepancies and errors obvious to all concerned.

One error that passed undetected on 2D drawings, yet was obvious in the 3D model, was that a planned staircase within the spiral ramp was two levels higher than necessary. In addition,

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the BIM structural team identified a superfluous column.

An issue that would prove more costly to Goodman over time arose with a heavy goods lift in the east side of the building. If built according to the engineers' drawings, it would mean that each floor would be 5.25 sq m less than planned – and with this reduction in area repeated on all of the floors, the building rental space potentially would have been less than originally planned.

Drawing on engineering expertise, the InteliBuild team proposed a suitable design change, which would allow the lift to be built whilst regaining the lettable floor area, whilst not compromising structural integrity.

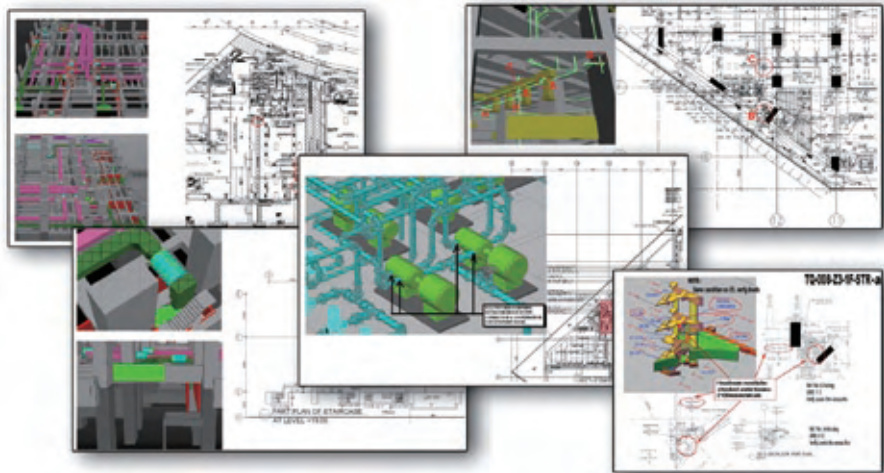
The team also flagged other design problems, such as clashes involving sprinkler pipe routes. The clashes

they identified were passed to the consultants, who revised their 2D drawings, and the information was in turn entered into the BIM model, to check the issues were resolved without creating new problems.

As the design co-ordination review and clash analysis is nearing completion, the InteliBuild team is now working on a new 4D clash analysis for the building construction. They will use Autodesk Navisworks timeline to check for issues involving objects such as cranes that move in time.

Design is coordination

Awareness of BIM is spreading quickly in Hong Kong, says Ir. Collins – yet there are misconceptions regarding BIM, and the term is sometimes misused: “We educate clients about what BIM is – it is not just pretty pictures.” To him,



the chief value of BIM is in design and construction coordination and clash analyses.

Ir. Collins is critical of traditional design methods in the construction industry, believing some industry practitioners may produce un-coordinated and poorly considered design drawings and the contractors accept that they will receive error-ridden plans leading to them facing many co-ordination issues and clashes on site. “There is a lack of design co-ordination management,” he says. “Yet I believe design is coordination – you can’t design a watch without figuring where the cogs go.”

BIM can eliminate many of these problems, though for it to be successful the client must be involved, ensuring clashes that are identified are corrected, so their investment is well placed and money can be saved during construction.

Summarising the BIM work by IntelliBuild – and emphasising where the teams add value, Ir. Collins says,

“Around 15% of our time is spent on modelling, and 85% on design co-ordination – focusing on what’s in the model and the analyses, identifying issues and communicating those issues to the designers and contractors.”



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About IntelBuild

IntelBuild are BIM + 3D Specialists. Experienced professional engineers and knowledgeable 3D CAD technicians collaborate to produce precise digital models for construction projects. The multi-disciplinary BIM models are used to identify design clashes and co-ordination issues. When combined with building programmes to create 4D models they can demonstrate site logistics and assist with construction planning.

IntelBuild are responsible for planning and implementing BIM processes on fasttrak projects in collaboration with the client, consultants and contractors. Their BIM Managers are experienced in training Architects, Structural and Building Services Engineers on how to use the BIM process to improve design integration and drawing production.